

Serial No. 10/849,571  
Reply to Office Action of June 12, 2007

Docket No. UMBC-0015

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1-14. (Canceled)

15. (Currently Amended) A system for determining damage information of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information;

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data; and

a damage information processor for receiving said stiffness parameters and outputting damage information comprising at least spatial damage information on said structure.

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16. (Currently Amended) The system according to claim 15, wherein said damage information processor outputs ~~damage location information or extent of damage information.~~

17-46. (Canceled).

47. (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order perturbation process.

48. (Currently Amended) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output

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vibration information; and

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a ~~higher~~ second or higher order perturbation process.

49. (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information and determining said stiffness parameters with an iterative processing unit;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order perturbation process.

50. (Currently Amended) A system for determining stiffness parameters of a structure, comprising:

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a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information and determining said stiffness parameters with an iterative processing unit;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a higher second or higher order perturbation process.

**51. (Currently Amended) A system, comprising:**

a structure;

a sensor arranged to measure vibrations of said structure and output vibration information;

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data; and

a damage information processor for receiving said stiffness parameters and outputting location of damage on said structure.

**52. (Previously Presented) The system according to claim 51, wherein said**

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damage information processor comprises a damage location processor for determining damage location information.

53. (Previously Presented) The system according to claim 51, wherein said damage information processor comprises a damage extent processor for determining extent of damage information.

54. (Previously Presented) The system according to claim 51, wherein said damage information processor comprises a damage extent processor for determining extent of damage information and a damage location processor for determining damage location information.

55. (Canceled).

56. (Previously Presented) A system, comprising:  
a structure;  
a random impact device for inducing vibrations in said structure, said random impact device comprising,  
a random signal generating unit for generating first and second outputs;

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a random impact actuator for receiving said first and second outputs; and  
an impact applicator coupled to said random impact actuator,  
wherein said random impact actuator drives said impact applicator  
such that the force and arrival times of said impact applicator at said structure are  
random;  
a sensor arranged to measure vibrations of said structure and output  
vibration information; and  
a stiffness parameter unit for receiving said vibration information,  
determining natural frequency data of said structure, and determining the stiffness  
parameters of said structure using said natural frequency data.

57. (Previously Presented) The device of claim 56, wherein said random  
impact actuator drives said impact applicator in accordance with said first and second  
outputs.

58. (Previously Presented) The device of claim 57, wherein the first and  
second outputs comprise independent random variables.

59. (Previously Presented) The device of claim 58, wherein the first and

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second outputs determine the force and arrival times, respectively, of the impact applicator at said structure.

60. (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining mode shape information, and determining the stiffness parameters of said structure using said mode shape information;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order perturbation process.

61. (Currently Amended) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining mode shape information, and determining the stiffness parameters of said

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structure using said mode shape information;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a ~~higher~~ second or higher order perturbation process.